

**Date:** 4/13/10

**Lesson Title:** Exponential Growth part 2

**Objective:** To discover what happens to the graphs of exponential functions when you change the parameters.

**In:** Describe what you remember from the **BILLER BACTERIA** lesson.

**An EXPONENTIAL FUNCTION is  
a function of the form**

$$y=ab^x$$

**where  $a \neq 0$ ,  $b \neq 1$ , and  $b > 0$  .**

What would happen if  $a = 0$ ?

What would happen if  $b = 1$ ?

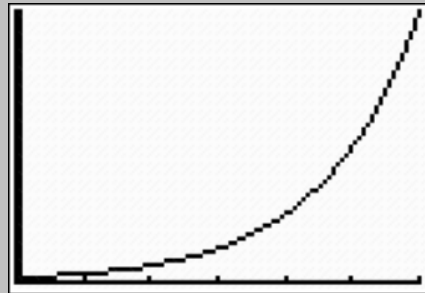
What would happen if  $b < 0$ ?

Is an EXPONENTIAL FUNCTION linear?

Use your calculator to graph the  
*Biller Bacteria*  
function.

$$f(x) = 25(2^x)$$

```
WINDOW
Xmin=0
Xmax=6
Xscl=1
Ymin=0
Ymax=1600
Yscl=1
Xres=1
```



What do you notice?

Use your algebraic expression to find the population of

**Biller bacteria**

after 12 hours.



Suppose that the INITIAL population of

**Biller bacteria**

was **75** instead of **25**.

What do you think will happen?

Find out how many bacteria there are after 12 hours.



What does  
changing the  
number in front do?

Suppose that the INITIAL population of

**Biller bacteria**

was **25**, but the bacteria **tripled** instead of **doubled**?

What do you think will happen?

Find out how many bacteria there are after 12 hours.



What does  
changing the  
multiplier do?

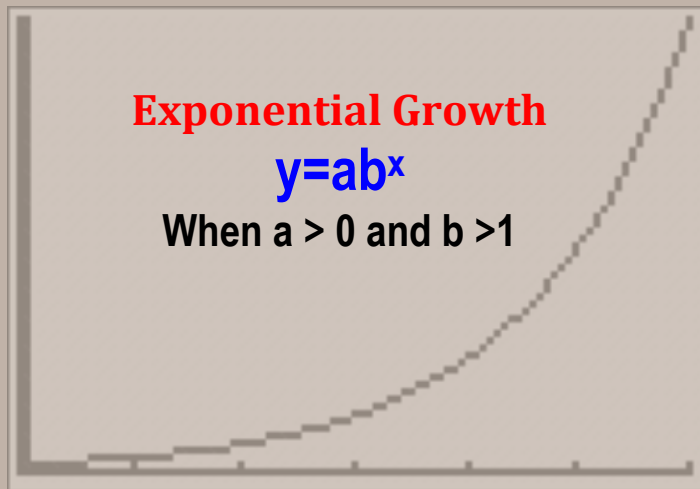
Exponential Functions that **increase** by the same  
**percentage** over time represent

**Exponential Growth.**

**Exponential Growth**

$$y=ab^x$$

When  $a > 0$  and  $b > 1$



The **exponential growth** model below will help you find the amount to which a quantity grows over time.

$$y = a(1 + r)^t$$

**a = the initial amount**

**r = the growth rate**

**t = time period**

**(1 + r) = the growth factor**

A comic book collector purchased a 1938 original marvel comic book for \$1000 in 1984. The value of the comic book increases by 26.5% per year.

$$y = a(1 + r)^t$$



How much is the comic book worth now (2009)?

The owner of a 1953 Hudson Hornet Convertible sold the car at an auction. The owner bought the car in 1989 for \$11,000. The value of the car increased by 6.9% per year.

$$y = a(1 + r)^t$$



How much is the car worth now (2009)?

*If you put \$250 in a savings account that earns 7% interest compounded yearly, how much will your investment be worth in 5 years?*



$$y = a(1 + r)^t$$



Compound interest helps you make money off of your money without any effort on your part! Compound interest is interest earned on both your investment and the interest you have gained off of the investment.

**Summary:** The main points of this lesson are...

**Out:** Create your own word problem involving the exponential growth model.

**Homework:** Exponent review worksheet